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ABSTRACT

Some of the variations in reading achievement and fluency levels among bilingual students enrolled in the Seattle Public Schools are explained, and an examination of the effects of special language services (English as a second language and bilingual subject matter instruction) is emphasized. A model is presented which examines the relationships among the following variables: reading achievement, relative English fluency, special language services, family income, language background and grade level. Results indicated that the bilingual population is: (1) low in relative English fluency; (2) largely composed of Asian language groups; (3) lower in reading achievement and higher in math achievement than the national norm group; and (4) composed of high proportions of low income families. No strong evidence was obtained supporting the assertion that special language services have a consistent or positive effect upon reading achievement. A summary of the report is included. (Author/GK)

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AN INVESTIGATION OF THE EFFECTS OF BACKGROUND CHARACTERISTICS AND SPECIAL LANGUAGE SERVICE ON THE READING ACHIEVEMENT AND ENGLISH FLUENCY OF BILINGUAL STUDENTS

REPORT NO. 79-19
NOVEMBER 1979

TOM MATTHEWS

Office of
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SEATTLE
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ABSTRACT

This report explains some of the variations in reading achievement and fluency levels among bilingual students* enrolled in the Seattle Public Schools and places special emphasis on an examination of the effects of special language services (English as a second language and bilingual subject matter instruction). The information yielded by this analysis should be of interest to those concerned specifically with implementing bilingual programs and to those interested in the effects of District programs in general.

A model is presented which examines the relationships among the following variables: reading achievement, relative English fluency, special language services, family income, language background and grade level. Results indicated that the bilingual population is: 1) low in relative English fluency; 2) largely composed of Asian language groups; 3) lower in reading achievement and higher in math achievement than the national norm group; and 4) composed of high proportions of low income families. Additionally, the data were consistent with most causal assumptions yielded by the model.

However, no strong evidence was obtained supporting the assertion that special language services have a consistent or positive effect upon reading achievement. In fact, most analyses revealed that served students scored lower in reading than not served students, even when previous achievement and/or other background characteristics were controlled. In addition, increases in reading achievement appeared to be similar in served and not served groups. Unfortunately, it cannot be determined whether this pattern of results was produced by inadequacies in special language programs, or whether it merely reflects a District attempt to deliver services to those students with the greatest need.

It is recommended that an evaluation be planned and implemented which contains the controls, outcome criteria, program definitions and objectives needed to adequately address questions of program effectiveness. Such a study would require extensive cooperation between the staff of the Bilingual Programs Office and the Evaluation Office, and it would yield information that would be prerequisite to an investigation of the cost effectiveness of various modes of special language services.

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* For the purposes of this report, a bilingual student is defined as any student who has been assigned to a relative English fluency category between A and E, inclusive (i.e., students with a primary or home language other than English).

TABLE OF CONTENTS

	Page
ABSTRACT	i
LIST OF TABLES	iv
LIST OF FIGURES	v
INTRODUCTION	1
THE MODEL	2
Variables	2
Achievement	2
Previous Achievement	2
Special Language Services	2
Relative English Fluency	2
Language Background	3
Family Income	3
Grade Level	3
PRESUMED RELATIONSHIPS	3
Background Characteristics and Achievement	3
Fluency and Achievement	5
Special Language Service, Fluency and Achievement	5
Grade Level and Achievement	5
RESULTS AND DISCUSSION	6
Characteristics of Bilingual Students	6
Two Variable Relationships	8
Three Variable Relationships	10
Three-plus Variable Relationships (Service)	10
Achievement Changes and Service	16
Relative English Fluency	16
Fluency and Achievement	19
Fluency Changes - Yearly	19
Fluency Changes by Service	21
The Model Reconsidered	21
Limitations	23
SUMMARY AND CONCLUSIONS	25
RECOMMENDATION	27
APPENDIX	28

LIST OF TABLES

		Page
TABLE 1	PERCENTAGE OF BILINGUAL STUDENTS IN CATEGORIES OF FLUENCY, LANGUAGE BACKGROUND, SCHOOL ACHIEVEMENT, FAMILY INCOME AND GRADE LEVEL	7
TABLE 2	PERCENTAGE OF READING ACHIEVEMENT SCORES (MAT, SPRING 1979) IN THREE STANINE CATEGORIES BY SERVICE, FLUENCY, INCOME, GRADE LEVEL AND LANGUAGE (GRADES 2, 4, 6 and 8)	9
TABLE 3	PERCENTAGE OF STUDENTS WITH TOTAL READING SCORES IN THREE STANINE CATEGORIES BY FLUENCY BY LANGUAGE BACKGROUND (MAT SPRING 1979 SCORES, GRADES 2, 4, 6, and 8)	11
TABLE 4	PERCENTAGE OF STUDENTS WITH TOTAL READING SCORES IN THREE STANINE CATEGORIES BY FLUENCY, BY FAMILY INCOME (MAT SCORES FROM SPRING 1979, GRADES 2, 4, 6 and 8)	12
TABLE 5	GAMMA (γ) VALUES FOR RELATIONSHIP BETWEEN SERVICE AND READING ACHIEVEMENT IN 64 GROUPS	14
TABLE 6	PERCENTAGE OF SERVED AND NOT SERVED STUDENTS IN THREE READING ACHIEVEMENT STANINE CATEGORIES BY PREVIOUS ACHIEVEMENT . . .	15
TABLE 7	PERCENTAGE OF BILINGUAL STUDENTS IN SERVED AND NOT SERVED GROUPS WHO INCREASED OR DECREASED THEIR READING PERCENTILE SCORES BY FLUENCY BY PREVIOUS ACHIEVEMENT (FALL 1978, SPRING 1979 MAT SCORES FOR GRADES 2, 6, and 8)	17
TABLE 8	PERCENTAGE OF BILINGUAL STUDENTS IN TWO FLUENCY CATEGORIES (A & B; C, D & E) BY SERVICE, FAMILY INCOME, LANGUAGE BACKGROUND AND ACHIEVEMENT	18
TABLE 9	PERCENTAGE OF FLUENCY A AND B STUDENTS WHO HAVE PROGRESSED TO LEVEL C, D, OR E	20
TABLE 10	PERCENTAGE OF FLUENCY CATEGORY A & B STUDENTS ENROLLED DURING 1976-77 AND 1978-79 WHO CHANGED FLUENCY CATEGORIES BY YEARS OF ESL SERVICE DURING THAT PERIOD	22

LIST OF FIGURES

Page

FIGURE 1 A MODEL SHOWING THE ASSUMED RELATIONSHIPS BETWEEN SCHOOL ACHIEVEMENT AND OTHER CAUSAL FACTORS 4

INTRODUCTION

In June 1976 the Seattle School District adopted a plan to maintain compliance with the 1974 Lau v. Nichols Supreme Court decision. This plan formalized procedures to provide students from non-English language backgrounds an opportunity for full participation in the educational program. Since that time, partly as a result of increases in the population of interest, the District has steadily increased its budget for special services to bilingual students. Data generated pertaining to special services have included student achievement on standardized tests, amount and type of instructional services, relative English fluency assessments, language background, grade level and family income. Although most of these data were generated originally as a by-product of Lau activities and not for the purposes of program evaluation, numerous requests to use the current data base to investigate the effects of special language services have been received. This report attempts to address the primary questions raised through these requests, and it examines the complex relationships among student outcomes, student characteristics and educational inputs. Such an investigation should be of interest to those concerned specifically with implementing bilingual programs and to those concerned with the effects of District programs in general.

Specifically, this report will explain variations in the English reading achievement and fluency levels among bilingual students using several pertinent background and school variables. Emphasis will be placed on an examination of the effects of special language services. The approach adopted for this analysis requires that a conceptual model be constructed which shows the presumed causal and noncausal relationships among all variables in the explanatory system. Using this model, one may examine the presumed relationships to determine whether they are consistent with the data available concerning bilingual students. More importantly the model will guide data analyses and provide a framework for their interpretation, thereby allowing logical deductions concerning the effects of one variable upon another.

THE MODEL

Variables

Variables to be used in this analysis are listed and described below.

Achievement. A measure of English language reading skills was selected as an indicator of bilingual student achievement. Although some special language programs are not designed to teach English reading skills directly, an academically successful bilingual student would be expected to acquire these skills. In addition, the enhancement of a basic skill such as reading may be viewed generally as a goal of nearly all District programs. Specifically, reading skills were measured by grouping students into upper, middle and lower three stanine categories. Total Reading percentile scores on the Metropolitan Achievement Test (MAT) from grades 2, 4, 6 and 8 (Spring, 1979) were selected for analysis. Grade levels were limited because representative samples of students were available only for even grade levels between 2 and 8, inclusive.

Previous Achievement. Previous achievement consisted of Total Reading percentile scores from the MAT grouped into three stanine categories (Fall, 1978). However, scores were limited to grades 2, 6 and 8 because an alternative test, the California Test of Basic Skills, (CTBS) was administered to 4th grade students in the Fall of 1978.

Special Language Services. For most of the analyses a dichotomous variable was constructed which placed students into alternative groups depending upon whether they received some special language service, or none (i.e., served/not served groups). Special language service included English as a second language services (ESL) and/or bilingual instruction in required subject matter (RSM): mathematics, science, health, social studies, language arts.

Relative English Fluency. For the purposes of this analysis the traditional five point fluency scale* was grouped into two categories - A & B (low fluency); C, D & E (high fluency).

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* Relative English fluency categories are usually defined in the following manner, consistent with the scale described in the District's Lau Plan.

A. Speaks no English

B. Speaks less English than another language

C. Speaks English and another language with equal ease

D. Predominantly speaks English

E. Speaks only English

Language Background. All language groups were combined into 7 categories and an "Other Languages" category, according to frequency of occurrence in the District: Chinese, Philippine, Korean, Spanish, Japanese, Samoan, Vietnamese, and Others. The "Other Languages" group is used as a convenience. It contains students who speak languages that are not frequently encountered in this District.

Family Income. Family income is a dichotomous variable in which students were grouped by whether they were eligible for free or reduced-price lunch or not. Eligibility was determined by an income/family size formula applied consistently for all District students who applied for lunch assistance.

Grade Level. Grade level is a dichotomous variable in which students from grades 2 & 4 were grouped into one category (lower grades) and students from grades 6 & 8 were placed in another (higher grades).

Presumed Relationships

The achievement levels of bilingual students can be explained, in part, using each of the measures discussed previously. However, because each of these characteristics is related in some way to achievement, as well as to other variables in the system, it is somewhat misleading to examine a single relationship between two characteristics (i.e. service and achievement or fluency and achievement) without considering the effects of other factors. Figure 1 is presented in an attempt to show diagrammatically the direction and location of various presumed relationships.

Single headed arrows indicate the assumed direction of causal flows and curved double headed arrows indicate noteworthy relationships among variables with no presumed causal link. Admittedly, the existence of the causal flows shown in this diagram cannot be proved; however, the diagram does link each variable in the system in a reasonable manner. These presumed linkages can then be examined systematically.

Background Characteristics and Achievement

Because background characteristics such as family income and language group occur before school achievement, in time, they may be viewed as indicators of life experiences which have an impact on school achievement. In an attempt to interpret the results of analyses presented herein, it has been assumed that variations in previous experiences (as represented by family income and language group) result in achievement differences. For example, students who originate from groups with adequate economic resources tend to have been exposed to environments which enhance school achievement. Likewise, different language backgrounds as indicators of divergent cultural experiences may tend to be related to differences in school achievement.

Some exceptions to this line of reasoning do occur. For instance, some bilingual students may have been reared in relatively high income environments; yet, they are currently receiving free or reduced-price lunch because of economic problems associated with recent immigration. Similarly, language background as categorized here is only a very general description of differences in experiences. Despite exceptions, the presumption of a causal effect on achievement

A MODEL SHOWING THE ASSUMED RELATIONSHIPS

BETWEEN SCHOOL ACHIEVEMENT AND OTHER CAUSAL FACTORS

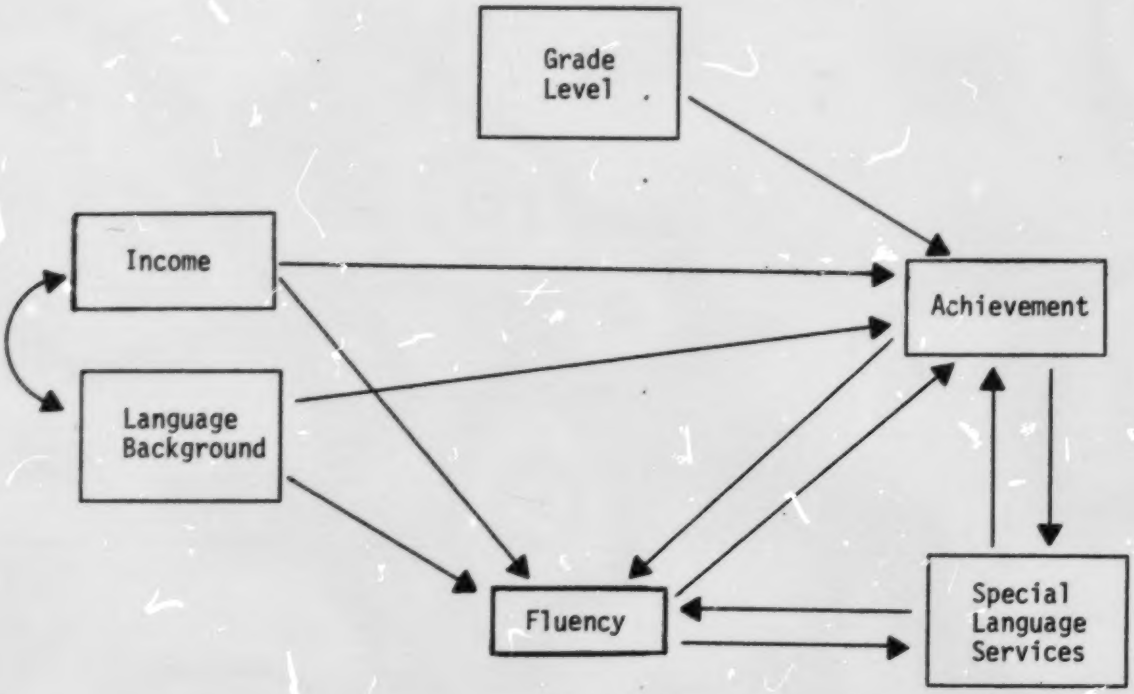

Figure 1

from background characteristics like income and language group seems reasonable as a tool to help explain achievement variations.

Fluency and Achievement

Relative English language fluency appears also to have a direct impact on school achievement. Because most school experiences occur in the English language, students who are not fluent in English usually achieve at a lower level than those who are more fluent when they are tested in English. Nearly all special language services are designed at least in part to improve school achievement by improving the students' English fluency. Most special language programs are based on the premise that increases in English fluency will be followed by increases in school achievement.

However, unlike family income or language background, fluency changes appear both to cause and to be caused by changes in achievement. For instance, an increase in fluency leads to achievement gains, and these gains eventually lead to higher assessments of fluency. Through this process a low achieving, low fluency student becomes a higher fluency, higher achieving student.

Special Language Service, Fluency and Achievement

In the model presented here, an antagonistic, two way effect is assumed between special language service and achievement. That is, increases in service presumably lead to increases in school achievement; however, these achievement increases tend to reduce the amount of special service received, thereby moderating the original effect of service. A similar two-way causal flow presumably exists between fluency and service. Low English fluency levels lead directly to high concentrations of service, but the increase in service presumably has the desired effect of raising fluency levels, thereby reducing the need for further service.

These antagonistic effects are difficult to isolate and examine because the two variables tend to work against one another. Further, it becomes difficult to talk precisely about the effects of service on fluency, or service on achievement, when the amount of service causes and in turn is caused by both variables. This methodological difficulty will persist as long as services are delivered only to those groups assumed to have the greatest need.

Grade Level and Achievement

Grade level as an indicator of student age may affect achievement in a unique manner. Older, low fluency students often appear farther behind in school because they are expected to achieve at a higher level than younger students. Further, students functioning with an English fluency handicap would be expected to fall farther behind as the curriculum becomes more complex and language dependent.

RESULTS AND DISCUSSION

Characteristics of Bilingual Students

In an attempt to describe generally the characteristics of bilingual students in this District (fluency levels A - E), Table 1 shows the percentage of students from various fluency categories, language backgrounds, achievement levels, grade levels and service patterns. A description of the relationships among these variables will be presented in a later section.

As of June, 1979, approximately one-third of the bilingual students (33.2%) were in fluency categories A or B; the remaining two-thirds (66.8%) were in categories C, D or E. Likewise, about one-third of all bilingual students received some kind of special language service during the 1978-79 school year and two-thirds did not. Students were distributed relatively evenly across grade levels. About half (51.3%) were in kindergarten through the sixth grade. The remaining 48.7% were in grades 7 through 12. Further, almost half (43.2%) of the bilingual students were eligible for free and reduced-price lunch; 33.1% of all District students were eligible for lunch assistance in June 1979. The language group containing the largest number of students was Chinese (24.7%), followed by Philippine languages (15.9%) and Spanish speaking groups; 23.6% of the students were from small language groups which together comprised the "Other" category.

Several points of interest should be noted concerning the achievement of bilingual students. Achievement levels in reading are somewhat below the national norm group: 26.2%* of those tested scored in the lower three stanines (L3S). One should remember, however, that a large portion of the students in fluency category A are not tested because they speak no English; therefore actual achievement levels are probably even lower. In contrast, the achievement levels in math are higher than the standards yielded by the national norm group; less than 17% of the bilingual students scored in the lower three stanines in math and over 30% scored in the upper three stanines (U3S).

The characteristics which distinguish bilingual students from the District as a whole are low English fluency levels, lower reading achievement, higher math achievement, a large proportion of low income families, and an apparent need among some students for special services to help cope with problems associated with limited English fluency.

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* If scores were consistent with the national norm group, one would expect 23% of the students to score in the lower three stanines (L3S) and 23% to score in the upper three stanines (U3S). The remaining 54% would fall in the middle three stanines (M3S).

TABLE 1

PERCENTAGE OF BILINGUAL STUDENTS IN CATEGORIES OF FLUENCY, LANGUAGE BACKGROUND, SCHOOL ACHIEVEMENT, FAMILY INCOME AND GRADE LEVEL

	Percent Students	
Fluency		
A & B	33.2	
C, D & E	66.8	N= 5262
Language Background		
Chinese	24.7	
Philippine	15.9	
Korean	7.3	
Spanish	9.2	
Japanese	5.8	
Samoan	4.6	
Vietnamese	8.9	
Other	23.6	N= 5262
Achievement (MAT - Spring 1979)		
Reading		
L3S ***	26.2	
M3S	51.2	
U3S	22.6	N= 1394*
Math		
L3S	16.7	
M3S	53.4	
U3S	30.2	N= 1400*
Family Income		
Free or reduced-price lunch-eligible	43.2	
Not eligible	56.8	N= 5262
Grade Level		
Kindergarten - 6	51.3	
7 - 9	22.8	
10 - 12	25.9	N= 5257**
Service (1978-79)		
Received some special language service	33.8	
Not served	66.2	N= 5262

* N based upon MAT Total Reading and Total Math for grades 2, 4, 6 and 8, Spring 1979

** N based upon all bilingual students in kindergarten through twelfth grade

*** L3S - lower three stanines
M3S - middle three stanines
U3S - upper three stanines

Two Variable Relationships

Table 2 shows the relationship between reading achievement and the following variables: special service, fluency, income, grade level and language background. As suggested by the general model there are, in fact, substantial relationships between various background characteristics and reading achievement.

Of the low English fluency students (A & B) who were tested 60.7% scored in the lower three stanines (L3S) in total reading; however, only 14.1% of the higher English fluency students (C, D & E) scored in the lowest stanine category. This relationship is statistically significant ($\chi^2 = 323.21$, $p \leq .05$) and yields a gamma (γ)* of .78. Generally, low fluency students tend to achieve at lower levels than higher fluency students.**

A similar relationship exists between family income and reading achievement. Proportionately more students from low income families than higher income families are in the lowest scoring group, 37.6% to 16.5%, respectively ($\gamma = .50, \chi^2 = 127.14, p \leq .05$).

Grade level is negatively related to reading achievement ($\gamma = -.21$, $\chi^2 = 31.07$, $p \leq .05$). That is, higher grades tend to have proportionately more students achieving at lower levels than low grades. Only 20% of the students in grades 2 and 4 are low achieving (about normal); in contrast, about 33% of the students in grades 6 and 8 are low achieving.

Differences in the distribution of achievement scores within various language groups are present also. ($\chi^2 = 111.99$, $p \leq .05$). The Samoan and Vietnamese language groups have the largest proportions of low achieving students, 54.1% and 42.2% respectively. Japanese speaking students have the highest proportion of high achievers (40.2%).

The relationships between reading achievement and fluency, income, grade level and language group are consistent with the presumed causal effect of these background characteristics on achievement. Based upon the results from the current sample one would expect to find the greatest proportion of low achievers in groups with low fluency (A & B), low income and high grade levels (grades 6 & 8). In addition one would expect to find proportionately more low achievers in Samoan and Vietnamese speaking groups.

The lack of perfect association between the background variables and achievement suggests that additional variables, special combinations of variables, or better measures of present variables are needed to explain more fully the variations in achievement.

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* gamma (γ) a measure of association used with ordinal level data. It varies between - 1.0 and + 1.0 A zero value indicates no relationship and deviations from zero indicate some relationship between the two variables of interest. Large deviations indicate strong relationships; the sign of the deviation indicates the direction of the relationship.

** Because Fluency C-E students comprise approximately two-thirds of the bilingual population in the District, their higher achievement levels tend to raise the overall achievement levels when examining the entire bilingual population.

TABLE 2

PERCENTAGE OF READING ACHIEVEMENT SCORES (MAT, SPRING 1979)
IN THREE STANINE CATEGORIES BY SERVICE, FLUENCY, INCOME,
GRADE LEVEL AND LANGUAGE (GRADES 2, 4, 6 and 8)

	Reading Achievement ***			
	%L3S	%M3S	%U3S	Totals N
Service				
Not Served	14.8	56.3	28.9	1011
Served	56.4	37.6	6.0	393
χ^2 = 266.02*, γ **** = .71				
Fluency				
A & B	60.7	35.4	3.8	364
C, D & E	14.1	56.7	29.2	1030
χ^2 = 323.21*, γ = .78				
Income **				
Low	37.6	51.2	11.3	647
Not Low	16.5	51.1	32.4	747
χ^2 = 127.14*, γ = .50				
Grade Level				
2 & 4	20.3	53.3	26.4	723
6 & 8	32.6	48.9	18.5	671
χ^2 = 31.07*, γ = -.25				
Language				
Chinese	23.7	54.3	22.0	350
Philippine Language	22.0	60.8	17.1	245
Korean	35.4	44.4	20.2	99
Spanish	31.5	47.6	21.0	124
Japanese	12.4	47.4	40.2	97
Samoan	54.1	43.2	2.7	74
Vietnamese	42.2	49.0	8.8	102
Other	19.8	47.2	33.0	303
χ^2 = 111.99*				

* $p \leq .05$

** Income: Low - eligible for free lunch
Not Low - not eligible for free lunch

*** Reading Achievement: L3S - Lower 3 stanines
M3S - Middle 3 stanines
U3S - Upper 3 stanines

**** γ - gamma - a measure of association used with ordinal data

Three Variable Relationships

Several relationships involving more than two variables are identified in the general model. For example, income is assumed to have a direct effect on achievement; in addition, it has an effect on fluency which has an effect on achievement. Likewise, language background has a direct effect on achievement and an indirect effect through fluency.

Table 3 shows the relationship between reading achievement and fluency for each language group. Using this approach, one may determine whether fluency, in fact, has an impact on achievement that is independent of the effect of language background. Note that the Philippine language group yields the strongest relationship between fluency and achievement (γ = .89) and the Samoan group yields the weakest relationship (γ = .52). That is, high fluency appears to lead to higher achievement (i.e., fourth stanine or above) more often in Philippine language groups than in Samoan groups.

This evidence suggests that changes in fluency have a smaller effect upon achievement in some language groups than in others. Specifically, if one assumes (as we have for this analysis) that increases in fluency cause increases in achievement, one may conclude that programs designed to improve fluency alone will have a greater effect on achievement in Philippine language groups than among Samoan speaking students. Groups such as the Samoans which show only moderate association between fluency and achievement may need service models which are designed not only to remedy fluency deficits but also to impact additional causes of low achievement. These possible additional causes are not examined in the present analysis.

In a similar analysis, Table 4 shows the relationship between reading achievement and fluency, controlling for family income (within homogeneous family income groups). Fluency continues to have a statistically significant effect on achievement even when the effects of family income are removed. The association between achievement and fluency for students from low income families yields a γ of .68 (χ^2 = 113.3, $p \leq .05$); students not from low income families yield a γ of .82 (χ^2 = 175.9, $p \leq .05$). Generally, lower fluency students tend to be lower achieving students, even when the effects of economic circumstances are removed. In contrast to the previous analysis where the magnitude of the relationship between fluency and achievement was widely different in various language groups, no important differences in the fluency - achievement relationship were obtained in groups from different economic circumstances.

Three-plus Variable Relationships (Service)

The general model indicates that numerous interrelated variables have an impact on school achievement. The effect of each of these characteristics has been examined previously using two and three variable analytic models. This section will expand the analyses to examine the independent effects of special language service on achievement.

Because it has been assumed that all variables in the model will have a direct effect upon achievement, the analysis proceeded by holding the effects of all

TABLE 3

PERCENTAGE OF STUDENTS WITH TOTAL READING SCORES

IN THREE STANINE CATEGORIES BY FLUENCY BY LANGUAGE BACKGROUND

(MAT SPRING 1979 SCORES, GRADES 2, 4, 6 and 8)

Language Background	Fluency	Reading Achievement ** %L3S	%M3S	%U3S	Total	χ^2	***γ
Chinese	A & B	66.2	28.4	5.4	74		
	C, D & E	12.3	61.2	26.4	276		
					350	94.8*	.80
Philippine Languages	A & B	62.5	37.5	0	56		
	C, D & E	10.1	67.6	22.3	188		
					244	72.5*	.89
Korean	A & B	64.3	31.0	4.8	42		
	C, D, & E	14.0	54.4	31.6	57		
					99	28.9*	.79
Spanish	A & B	70.6	29.4	0	17		
	C, D & E	25.2	50.5	24.3	107		
					124	15.4*	.7[illegible]
Japanese	A & B	47.4	42.1	10.5	19		
	C, D & E	3.8	48.7	47.4	78		
					97	28.7*	.80
Samoan	A & B	70.0	30.0	0	30		
	C, D & E	43.2	52.3	4.5	44		
					74	5.7	.52
Vietnamese	A & B	53.5	43.7	2.8	71		
	C, D & E	16.1	61.3	22.6	31		
					102	18.1*	.71
Other	A & B	55.6	37.0	7.4	54		
	C, D & E	12.0	49.4	38.6	249		
					303	56.9*	.75

* $p \leq .05$

** L3S - lower three stanines
M3S - middle three stanines
U3S - upper three stanines

*** γ - gamma - a measure of association used with ordinal data

Note: Overall γ for reading achievement and fluency, ignoring language background = .78 ($p \leq .05$)

TABLE 4

PERCENTAGE OF STUDENTS WITH TOTAL READING SCORES

IN THREE STANINE CATEGORIES BY FLUENCY BY FAMILY INCOME

(MAT SCORES FROM SPRING 1979, GRADES 2, 4, 6 AND 8)

Family Income	Fluency	Reading Achievement ** %L3S	%M3S	%U3S	Total	χ^2	γ
Not low	Low	56.2	38.8	5.0	121		
	High	8.8	53.4	37.8	625		
					746	175.9*	.82
Low	Low	63.2	33.5	3.3	242		
	High	22.2	61.7	16.0	405		
					647	113.3*	.68

* $p \leq .05$

** L3S - lower three stanines

M3S - middle three stanines

U3S - upper three stanines

Note: Overall γ for reading achievement and fluency, ignoring family income = .78 ($p \leq .05$)

background variables (fluency, language background, income and grade level) constant and examining the relationship between service and achievement within the resulting 64 groups. The γ values for the relationships between service and achievement in these groups are shown in Table 5; a full display of all percentages and totals within served and not served groups is shown in the appendix. Of the 64 statistical tests, only six resulted in significant ($\alpha = .05$) relationships between service and achievement. Although the number of statistically significant findings was only marginally higher than the number expected if no effect were actually present, the direction of the findings was consistent. In each statistically significant instance, the highest proportion of low achieving students (L3S) was in the served group rather than in the not served group.

This analysis indicates that controlling for traditional background characteristics fails to produce evidence in favor of a strong effect of special language service on reading achievement. Instead, statistically significant results reveal that students who are not served have higher reading achievement levels than students who are served.

Since one could reasonably argue that the failure to obtain additional statistically significant results was due, in part, to examining groups with small numbers of cases, additional analyses were completed to further examine the initial findings. Instead of using all combinations of 4 background characteristics to control previous experience, students were divided into 3 stanine groups on the basis of their Fall, 1978 MAT Total Reading scores - L3S, M3S, U3S. This procedure produced 3 larger, yet homogeneous groups in terms of previous achievement. These groups were then examined to determine if their Spring 1979 achievement showed effects of special language service during the 1978-79 school year. Results are shown in Table 6.

Within each of the three previous achievement groups (Fall 1978) a negative relationship between Spring, 1979 reading achievement and service was obtained. That is, in each of the Fall 1978 achievement groups, proportionately more served students than not served students fell into the lower three stanines in the spring. In the group scoring in the lower 3 stanines in the fall, 81.3% of the served students were still low achievers in the spring, compared to 64.2% of the not served group. Similarly, in the middle previous achievement group, 18.9% of the served students were in the lower 3 stanines in the spring compared to only 7.2% in the not served group. The relationships between service and achievement were statistically significant for the low and middle previous achievement students ($\chi^2 = 9.29$ and 12.07, respectively; $p \leq .05$). Results were in the same negative direction but not statistically significant in the highest previous achievement group. Although controlling for previous achievement levels reduced the negative relationship between service and achievement, it did not eliminate it or change it to a positive relationship.

The results of a third analysis which examined service and achievement within groups which were homogeneous in terms of income, fluency and previous achievement is presented in the appendix. That analysis also supports the assertion that students who receive service tend to score more poorly in reading than students who do not receive service - even when differences in important background characteristics are controlled.

TABLE 5

GAMMA (γ) VALUES FOR RELATIONSHIP BETWEEN SERVICE AND READING ACHIEVEMENT IN 64 GROUPS

Grade Level	Fluency	Income	Chinese	Philippine	Korean	Spanish	Japanese	Samoan	Vietnamese	Other
High	High	High	- .82	- .52	- .11	-	-	0	-	-1.0 *
High	High	Low	- .48	.38	-1.0	-.37	-	-	- .84	- 2[illegible]
High	Low	High	1.0	1.0	1.0	-	-	-	1.0	-
High	Low	Low	- .89*	- .61	1.0	-	-	-1.0	- .69	- .84*
Low	High	High	- .20	- .08	.06*	.02	-	-	0	-1.0*
Low	High	Low	- .20	- .67	- .50	-.66	-	- .69	-.60	- .54
Low	Low	High	-1.0	- .14	- .75	-	-.88	-	-	.39
Low	Low	Low	-1.0*	- .05	- .75	-	-	- .11	.15	.69

* $p \leq .05$ for appropriate χ^2 or Fishers exact probability test

Note: 1. dashes (-) are shown when γ could not be calculated because of insufficient data

2. MAT scores are from Spring 1979, grades 2, 4, 6 and 8

TABLE 6

PERCENTAGE OF SERVED AND NOT SERVED STUDENTS IN THREE READING ACHIEVEMENT STANINE CATEGORIES BY PREVIOUS ACHIEVEMENT

Previous (Fall 1978) Reading Achievement	Served	Spring 1979 Reading Achievement ** %L3S	%M3S	%U3S	Total N	χ^2	γ ***
L3S	No	64.2	35.8	0	109		
	Yes	81.3	17.7	1.0	96		
					205	9.29*	-.40
M3S	No	7.2	80.3	12.5	401		
	Yes	18.9	72.2	8.9	90		
					491	12.07*	-.34
U3S	No	0	16.2	83.8	191		
	Yes	0	35.7	64.3	14		
					205	3.42	-.48

* $p \leq .05$

** L3S - lower three stanines

M3S - middle three stanines

U3S - upper three stanines

*** γ - gamma - a measure of association used with ordinal data

Note: Overall γ for reading achievement and service, ignoring previous achievement = -.71 ($p \leq .05$)

In summary, no evidence of a positive effect of special language service on reading achievement has been obtained. In contrast, some results indicate that bilingual students who receive no service tend to score generally higher in reading achievement than comparable students who receive service, even when previous achievement levels and/or other background characteristics are held constant.

Achievement Changes and Service

Even if one accepts the idea that served students achieve in reading at a lower level than not served students, one may ask a slightly different question about achievement: Do served and not served students improve their reading achievement at a similar rate? Table 7 summarizes an analysis which shows the relationship between changes in 1978-79 reading achievement and service within 6 homogeneous groups (representing combinations of fluency and previous achievement). If a student improved or maintained his reading percentile score (from fall to spring, 1978-79) he was assigned to one category of achievement change; if his achievement declined, he was assigned to a different category. Generally, similar proportions of served and not served students increased their reading percentile scores between the fall and spring.

Because the number of served and not served students tended to be small in some of the six groups, additional analyses were performed in which students were grouped first according to their Fall 1978 reading achievement (previous achievement), and then according to fluency levels. Within each of these groups, the relationship between service and reading achievement was similar in served and not served groups (Table C is appended).

These results combined with those of the previous section demonstrate that served students tend to score lower than not served students even when background variables such as fluency and previous achievement are held constant. In addition, the served and not served students tend to improve their reading percentile scores in similar proportions (thus students who are not served progress in English reading skills as rapidly as those who are served).

Relative English Fluency

The general model presented in Figure 1 indicates that several variables have an effect upon the relative English fluency of bilingual students - special language service, family income, language background and school achievement. Table 8 summarizes the relationship between these variables and fluency.

As expected, the relationship between fluency and service indicates that fluency category A & B students tend to receive special language services (83.1% receive some kind of service); C, D and E students typically receive no such service (90.7% receive no service). These patterns are consistent with District attempts to give priority for special service to those students in the lowest English fluency categories.

The relationship between family income and fluency suggests that bilingual students from low income families tend to have lower levels of English fluency. For example, 59.8% of the A and B students are from low income families. In

TABLE

PERCENTAGE OF BILINGUAL STUDENTS IN SERVED AND NOT SERVED GROUPS WHO INCREASED OR DECREASED THEIR READING PERCENTILE SCORES, BY FLUENCY BY PREVIOUS ACHIEVEMENT (FALL 1978, SPRING 1979 MAT SCORES FOR GRADES 2, 6 AND 8)

Fluency	Previous Achievement (Fall 1978)	Achievement Change	Service Group % Not Served	% Served	X^2	Y
Low	L3S	down	33.3	27.5		
		same/up	63.7	72.5		
		Total N	21	80	.27	.13
Low	M3S	down	52.2	46.7		
		same/up	47.8	53.3		
		Total N	23	60	.20	.11
Low	U3S	down	71.4	40.0		
		same/up	28.6	60.0		
		Total N	7	5	--	.58
High	L3S	down	23.9	18.8		
		same/up	76.1	81.3		
		Total N	88	16	.20	.15
High	M3S	down	36.5	40.0		
		same/up	63.5	60.0		
		Total N	378	30	.14	-.07
High	U3S	down	46.7	77.8		
		same/up	53.3	22.2		
		Total N	184	9	3.3	-.59

Note: No statistically significant X^2 values ($p \leq .05$) were obtained from this analysis

TABLE 8

PERCENTAGE OF BILINGUAL STUDENTS IN TWO FLUENCY CATEGORIES (A & B; C, D & E) BY SERVICE, FAMILY INCOME, LANGUAGE BACKGROUND AND ACHIEVEMENT

	FLUENCY			
	% A & B	% C,D & E	X^2	Y
Service				
Served	83.1	9.3		
Not served	16.9	90.7		
Total N	(1749)	(3513)	2844*	-.73
Family Income				
Low	59.8	35.0		
Not Low	40.2	65.0		
Total N	(1749)	(3513)	293.8*	.47
Language Background				
Chinese	22.4	25.8		
Philippine	11.7	18.0		
Korean	11.0	5.4		
Spanish	5.2	11.2		
Japanese	4.1	6.7		
Samoan	5.4	4.3		
Vietnamese	20.3	3.2		
Other	20.0	25.3		
Total N	(1749)	(3511)	545.0*	
Achievement - Reading				
L3S	60.7	14.1		
M3S	35.4	56.7		
U3S	3.8	29.2		
Total N	(364)	(1030)	323.2*	.78
Achievement - Math**				
L3S	30.1	11.7		
M3S	53.8	53.0		
U3S	16.1	35.4		
Total N	(379)	(1021)	90.4*	.46

* $p \leq .05$

** Achievement scores are from the MAT Total Reading and Total Math, Spring 1979 - grades 2, 4, 6 & 8.

contrast, only 35% of the C, D and E students are from similar circumstances. Language group differences within fluency categories also exist. The Chinese, Vietnamese and "Other" language groups account for the highest proportions of A & B students (about 20% of the A & B's are in each group) and Spanish, Samoan and Japanese groups account for lower proportions (about 5% each). However, within language groups the Vietnamese and Korean speaking students have the highest proportions of A & B students; Spanish and Japanese groups have the highest proportions of C, D & E students.

Fluency and Achievement

The relationship between fluency and achievement deserves special attention because both have been viewed as outcomes of special language service and as indicators of a need for special service. Students in low English fluency categories have been given special language service because it has been assumed that limited English fluency is a major cause of low achievement, and that fluency increases will therefore result in school achievement increases. However, the relationship between fluency and achievement is far from perfect.

The latter part of Table 8 shows a cross tabulation of reading and math achievement by fluency categories. Note that most low fluency students (A & B) fall into the lower three stanines in reading (60.7%); however, 3.8% of the low fluency students fall into the upper three stanines and 35.4% are in the middle three. As expected the higher fluency group (categories C - E) has proportionately more high achievers than the low fluency group in both reading and math. Limited numbers of low fluency, high achieving students and high fluency, low achieving students will continue to be evident as long as English fluency and school achievement are imperfectly related. Further, an imperfect relationship should not be unexpected because relative English fluency and school achievement are different characteristics and neither is measured with perfect reliability. Reading achievement scores are probably the combined result of measurement error, English fluency, and numerous other student, school and background characteristics.

Fluency Changes - Yearly

Change in fluency over time has been an issue of continuing concern to District and State personnel. Table 9 shows the percentage of lower fluency students (A & B) who have moved to fluency level C or above by year (data are from 1975-76 to 1978-79, inclusive). For fluency A students, who presumably started with no English fluency, less than 5% moved to categories C, D or E within one year. Within two years about 15% moved to C, D or E and within 3 years about 38% of the A's did so. Note that the majority of the A's require more than 3 years to move to C or above. For fluency B students, about 25% moved to C or above within one year; about 40% moved in two years* and over 70% did so within three years. Generally, these results suggest that nearly two-thirds of all low fluency students move to adequate English fluency levels (C, D or E) within 3 years.

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* Larger proportions of movements within one and two year periods are shown for students in the District during 1975-76. Since these movements are not consistent with those observed in the following years, they are interpreted as a reflection of initial difficulties in fluency assessment procedures rather than as indications of actual fluency movements.

TABLE 9

PERCENTAGE OF FLUENCY A AND B STUDENTS WHO HAVE PROGRESSED TO LEVEL C, D OR E

	% moved to C or above	Total N
ONE YEAR MOVEMENTS		
Fluency A		
Status of 1975-76 Fluency A students in 1976-77	24.8	210
Status of 1976-77 Fluency A students in 1977-78	4.3	162
Status of 1977-78 Fluency A students in 1978-79	1.9	215
Fluency A		
Status of 1975-76 Fluency B students in 1976-77	56.9	576
Status of 1976-77 Fluency B students in 1977-78	25.7	670
Status of 1977-78 Fluency B students in 1978-79	20.2	925
TWO YEAR MOVEMENTS		
Fluency A		
Status of 1975-76 Fluency A students in 1977-78	23.1	186
Status of 1976-77 Fluency A students in 1978-79	15.0	144
Fluency B		
Status of 1975-76 Fluency B students in 1977-78	63.4	475
Status of 1976-77 Fluency B students in 1978-79	43.3	543
THREE YEAR MOVEMENTS		
Fluency A		
Status of 1975-76 Fluency A students in 1978-79	38.2	157
Fluency B		
Status of 1975-76 Fluency B students in 1978-79	73.9	399

Note: Samples for each comparison are based upon students in the District during both dates of concern, i.e., three year movements are based upon students in the District in 1975-76 and 1978-79

Additionally, and not surprisingly, fluency B students tend to make faster progress to category C or above than fluency A students. However, a sizable residual of fluency B students require more than three years to move beyond their current fluency category.

Fluency Changes by Service

After examining yearly changes in fluency categories one might reasonably ask: Are the fluency changes occurring primarily in served or not served students? In an effort to answer this question, a sample of A & B students who were in the District during 1976-77 (June) and 1978-79 (Winter) was selected. The number of years in which each student had received English as a second language (ESL) service during the period of concern was determined. Table 10 shows the percentage of A & B students (1976-77) who became C, D or E students (between 1976-77 and 1978-79) by years of ESL service. Note that 81% of the A & B students who received no ESL service during the years of interest moved to the C, D or E category. In contrast, only 29% of those who had received two years of ESL service and 5% of those who had received three years of service moved to the C, D or E category by 1978-79.

A similar trend is observed when A's and B's are examined separately. Those who have received no ESL service tended to move to C or above in higher proportions than those who had received some service. If students receiving ESL service also tend to be receiving other types of special language services, one would expect the same pattern to emerge from an analysis of other modes of special language services.

The Model Reconsidered

Because the conceptual model presented in this paper guided data analyses, it is useful to determine where the empirical results and the assumed model are consistent. For example, results were consistent with the assumption of a direct effect of grade level, income and language background on the reading achievement of bilingual students. Higher achieving students tended to be from specific language groups, higher income families and lower grade levels. The assumption that family income and language background have a direct effect on English fluency was also consistent with the data. Higher fluency students tended to come from higher income families and specific language groups. The results were consistent also with the assumption that fluency and achievement reinforce one another. That is, high fluency appears to lead to high achievement which in turn leads to still higher fluency levels. This reinforcing pattern is reflected by a strong positive relationship between relative English fluency and reading achievement.

It is much more difficult to reasonably interpret the agreement between the model and the results where antagonistic, two-way causal assumptions are involved (i.e., between fluency and service, or achievement and service). For example, results indicate that students in low fluency groups tend to receive most of the special language service. As indicated in an earlier discussion of the model, this result probably reflects the fact that students receive service until their fluency levels rise; then service is withheld (i.e. a two-way antagonistic effect).

In a similar vein results indicate that bilingual students who have received

TABLE 10

PERCENTAGE OF FLUENCY CATEGORY A & B STUDENTS ENROLLED DURING 1976-77 AND 1978-79 WHO CHANGED FLUENCY CATEGORIES BY YEARS OF ESL SERVICE DURING THAT PERIOD

	Years of ESL Service*			
	None	1	2	3
% A's who moved to C, D or E	44%	37%	13%	5%
Total A's	9	19	53	63
% B's who moved to C, D or E	84%	57%	34%	5%
Total B's	108	148	180	130
% A & B who moved to C, D or E	81%	54%	29%	5%
Total A's & B's	117	167	233	193

* Any amount of ESL service during a given year is counted as an additional year's service

special language services tend to achieve at lower levels than those who have not been served. This finding is consistent with the antagonistic, two-way causal flow assumed to exist between special language service and achievement. That is, results agree with the assumption that low achieving students are served until their achievement rises; then special language service is withheld as the student shows a sufficient level of achievement. However, the results are consistent also with the possible existence of a direct negative effect of special language service on achievement. The finding that students who are not served tend to achieve at higher levels than students who are served is especially difficult to interpret as a result of program implementation procedures because it persists even when variables such as fluency and previous achievement are held constant. Given the limitations of the current data base it is impossible to determine with any confidence whether the results are a reflection of the effects of service or whether they merely reflect current program implementation practices.

LIMITATIONS

Limitations associated with data analysis must be asknowledged so that the reader can assess the integrity and generalizability of results. In addition, limitations to an evaluation study should be identified and removed in future projects. For these reasons the following are presented.

1. All analyses of achievement levels are limited to a sample of bilingual students in grades 2, 4, 6 and 8 who were administered the MAT during the 1978-79 school year.

2. When the data used in this analysis were generated, no attempt was made to form comparable served and not served groups for the purposes of an evaluation of service effectiveness. Therefore, all comparisons are necessarily "after the fact" and subject to several reasonable but varied interpretations.

3. On several occasions, comparisons were meaningless because data available from the existing bilingual population yielded sample sizes within groups that were extremely small and/or disproportionate.

4. Much of this report has been devoted to an analysis of reading achievement in English. One might assert that this outcome is not directly pertinent to the current objectives of special language programs. However, standardized tests utilizing the native languages of the students under study were not available, nor were measures available that were tied more directly to course objectives.

5. The practice of delivering service to those students with the greatest perceived need and withholding service when it is judged as unnecessary yields service comparisons that should be interpreted with extreme caution.

6. Comparisons of fluency changes across service groups should also be interpreted with caution because service is administered mostly to

those students with low English fluency levels. Low English fluency students who are not served are probably different in several important ways (e.g. many have refused special language service) from those who are served.

SUMMARY AND CONCLUSIONS

The analyses presented in this report prompt the following conclusions.

1. The characteristics which distinguish bilingual students as a group from other student populations are shown below.

   a) Low relative English fluency

   b) Primarily Asian language backgrounds

   c) Lower reading achievement

   d) Higher math achievement

   e) Relatively large proportions of low income families

2. The following relationships between reading achievement and other characteristics of bilingual students were obtained.

   a) Special language services (ESL and bilingual RSM) are concentrated among low achieving students. Over half of the bilingual students who receive special language services score in the lower three stanines in reading achievement; students who are not served tend not to score as low, (only 14.8% score in the lower 3 stanines).

   b) Over 60% of the low fluency students (A & B) scored in the lower three stanines in reading; students with higher fluency levels (C, D & E) tended to score higher than expected, given national norms. A perfect relationship between fluency and achievement was not obtained. As a result, some high achieving, low fluency students were identified. This pattern should not be surprising, since relative English fluency and reading achievement are not identical characteristics and neither is measured with perfect reliability.

   c) A larger proportion of the students from low income families (eligible for free or reduced-price lunch) than from higher income families, score in the lower three stanines in reading.

   d) Some language groups have higher proportions of low achieving students than other groups. Samoan and Vietnamese groups contain the highest proportions of low achievers (L3S). Japanese and "Other" language groups have the highest proportions of high achieving students (U3S).

   e) Students in grades 6 and 8 tend to score lower in reading than students from lower grades.

3. The following additional relationships were obtained between relative English fluency and other characteristics of bilingual students.

   a) Nearly 83% of the fluency category A & B students are receiving some form of special language service; less than 10% of the C, D and E students are receiving such services.

   b) Low English fluency students tend to be from low income families, as determined by their eligibility for free or reduced-price lunch. Over half of the fluency A & B students are from low income families; only 35% of the C. D, & E students are from similar circumstances.

   c) The largest proportions of low fluency students are from Chinese and Vietnamese language groups. Within language groups, Vietnamese and Korean speaking groups have the highest proportions of low fluency students.

4. The relationship between fluency and achievement is different within various language groups. Students who speak Philippine languages produced the strongest relationship between fluency and achievement; Samoan speaking students produced the lowest relationship. This result suggests that increases in fluency should be expected to have a different impact on achievement within different language groups, and that groups such as the Samoans may benefit from services designed to address problems in addition to limited fluency.

5. Bilingual students who have <u>not</u> received special language services tend to score higher in reading than students who have received such services. Results consistent with this conclusion were obtained when previous achievement, fluency levels and/or other background characteristics were controlled. Further, the proportions of students who increased their reading percentile scores from Fall 1978 to Spring 1979 were not significantly different in served and not served groups. One may assume that these achievement patterns reflect the fact that students who receive special language services tend to be those who have the greatest need for services, and that those who receive no service tend to have no pressing need. However, the data are consistent also with the notion that special language services inhibit reading achievement. A well designed study which maintains some control over the assignment of students to service groups is required to determine which explanation is correct.

6. Approximately two-thirds of the A & B students who were in the District for a three year period (1975-76 to 1978-79) moved to fluency categories C, D or E within that time. As might be expected, students in fluency category A showed proportionately fewer shifts to category C or above than students in category B. These findings must be related to criteria for State funding of bilingual services which is beginning in 1979-80. A three-year maximum service period is generally specified for State funding.

7. Fluency category A & B students who have received no ESL service tend to move to level C or above proportionately more often than students who have received between one and three years of ESL service. Again, this relationship probably exists because students who have the greatest need for service tend to be served in repeated years. Students who do not need service tend to progress steadily in fluency without special aid. However, a study with more rigorous controls is needed to determine why one observes less rapid fluency movements among students who receive more special language services.

RECOMMENDATION

With the aid of the current data base, this report has described the bilingual population in terms of reading achievement, fluency, service, grade level, language background and family income. In addition, relationships among these characteristics have been examined. However, an analysis of the current data base did not yield conclusions concerning the effects of special language services which could be defended strongly. A number of insurmountable limitations precluded a conclusive analysis of special language programs. Among these were 1) noncomparable served and not served groups 2) low sample sizes within some groups, and 3) a lack of specific program definitions and objectives.

Given this impasse and assuming that the District and public require estimates of the magnitude of the effects of special language services, it is recommended that an evaluation be planned and implemented which contains the controls, outcome criteria, program definitions and objectives needed to address questions of service effectiveness. This study would require extensive cooperation between the staff of the Bilingual Programs Office, and the Evaluation Office, and it would yield information that would be prerequisite to an investigation of the cost effectiveness of various modes of special language services.

APPENDIX

	Page
TABLE A . . PERCENTAGE OF STUDENTS AT THREE READING ACHIEVEMENT LEVELS BY SERVICE, BY INCOME, BY FLUENCY, BY GRADE LEVEL	29
TABLE B . . PERCENTAGE OF STUDENTS AT THREE READING ACHIEVEMENT LEVELS BY SERVICE, BY INCOME, BY FLUENCY, BY PREVIOUS ACHIEVEMENT	30
TABLE C . . PERCENTAGE OF BILINGUAL STUDENTS IN SERVED AND NOT SERVED GROUPS WHO HAD INCREASED OR DECREASED READING PERCENTILE SCORES BY PREVIOUS ACHIEVEMENT AND FLUENCY	31

PERCENTAGE OF STUDENTS AT THREE READING ACHIEVEMENT LEVELS
BY SERVICE, BY INCOME, BY FLUENCY, BY GRADE LEVEL

TABLE A

Grade Level	Fluency	Income	MAT Total Reading Stanine Divisions	Language Group: Chinese		Philippine		Korean		Spanish		Japanese		Samoan		Vietnamese		Other	
				Service **															
				No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
High	High	High	L3S%	11.4	50.	8.2	0	20	0	18.2	0	6.3	0	50	50	50	0	* 5.9	100
			M3S%	60.8	50.	65.3	100.	55	100	50	0	56.3	0	50	50	50	100	51.5	0
			U3S%	27.8	0	26.5	0	25	0	31.8	0	37.5	0	0	0	0	0	42.6	0
			Total N	79	2	49	1	20	1	22	0	[illegible]	0	2	2	2	1	101	1
High	High	Low	L3S%	18.9	33.3	20.5	0	0	33.3	35.7	50	0	0	58.8	0	9.1	50	41.2	50
			M3S%	67.9	66.7	70.5	100	100	66.7	50.0	50	20	0	41.2	0	72.7	50	47.1	50
			U3S%	13.2	0	9.1	0	0	0	14.3	0	80	0	0	0	18.2	0	11.8	0
			Total N	53	6	44	1	8	3	14	8	5	0	17	0	11	2	17	4
High	Low	High	L3S%	100	83.3	100	60.0	100	60	0	100	0	0	0	0	100	100	0	66.7
			M3S%	0	16.7	0	40	0	40	0	0	0	80	0	0	0	0	0	33.3
			U3S%	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0
			Total N	1	12	1	10	1	5	0	1	0	5	0	0	1	2	0	6
High	Low	Low	L3S%	*57.1	96.2	57.1	84.6	100	88.9	0	83.3	0	0	66.7	100	57.1	88.2	*50	91.7
			M3S%	42.9	3.8	42.9	15.4	0	11.1	0	16.7	0	0	33.3	0	42.9	11.8	0	8.3
			U3S%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0
			Total N	7	26	7	13	1	9	0	6	0	0	3	8	7	17	2	12
Low	High	High	L3S%	5.8	21.4	4.0	0	* 0	33.3	12.0	0	0	0	0	0	25	0	* 7.3	100
			M3S%	55.1	42.9	56.0	66.7	56.3	0	48.0	66.7	45.9	0	50	0	50	100	45.1	0
			U3S%	39.1	35.7	40.0	33.3	43.8	66.7	40.0	33.3	54.1	0	50	0	25	0	47.6	0
			Total N	69	14	50	3	16	3	25	3	37	0	2	0	4	1	82	1
Low	High	Low	L3S%	4.8	27.3	8.3	25.0	25	50	26.7	60.0	25.0	0	27.8	66.7	11.1	0	11.8	33.3
			M3S%	73.8	45.5	80.6	75.0	75	50	53.3	40.0	50.0	0	66.7	33.3	44.4	100	55.9	55.6
			U3S%	21.4	27.3	11.1	0	0	0	20	0	25	0	5.6	0	44.4	0	32.4	11.1
			Total N	42	11	36	4	4	2	30	5	4	0	18	3	9	1	34	9
Low	Low	High	L3S%	0	57.1	33.3	40.0	0	63.6	0	50.0	0	41.7	100	100	0	50.0	60	41.7
			M3S%	75.0	42.9	66.7	60.0	100	27.3	0	50.0	50.0	50.0	0	0	0	25	40	50.
			U3S%	25.0	0	0	0	0	9.1	0	0	50.0	8.3	0.	0.	0	25	0	8.3
			Total N	4	7	3	10	3	11	0	2	2	12	1	1	0	4	5	12
Low	Low	Low	L3S%	*0	33.3	60	62.5	0	63.6	0	62.5	0	0	50	55.6	40.0	34.3	66.7	28.6
			M3S%	0	60.0	40	37.5	100	27.3	0	37.5	0	0	50	44.4	60.0	62.9	33.3	57.1
			U3S%	100	6.7	0	0	0	9.1	0	0	0	0	0	0	0	2.9	0	14.3
			Total N	2	15	5	8	1	11	0	8	0	0	8	9	5	35	3	14

Note: Scores are from MAT, Spring 1979, grades 2, 4, 6, 8 (Total Reading)

* P ≤ .05; statistically significant tables are noted even though N's yield data which should be interpreted with circumspection.

** Service: NO - received no special language services during 1978-79
YES - received some special language service during 1978-79

TABLE B APPENDIX 2

PERCENTAGE OF STUDENTS AT THREE READING ACHIEVEMENT LEVELS
BY SERVICE, BY INCOME, BY FLUENCY, BY PREVIOUS ACHIEVEMENT

Fluency	Income	Current Achievement (Spring 1979)	Low Previous Achievement-Fall 1978		High Previous Achievement-Fall 1978	
			Not Served	Served	Not Served	Served
High	High	L3S	23.5	35.7	0	0
		M3S	74.3	64.3	44.3	30.8
		U3S	2.2	0	55.7	69.2
		Total N	179	14	377	13
High	Low	L3S	30.4	59.5	.7	0
		M3S	68.5	40.5	60.4	73.7
		U3S	1.1	0	38.8	26.3
		Total N	184	37	134	19
Low	High	L3S	70	59.6	0	20
		M3S	30	36.5	71.4	60
		U3S	0	3.8	28.6	20
		Total N	10	52	7	10
Low	Low	L3S	45.8	38.9	0	9.5
		M3S	54.2	58.9	50	66.7
		U3S	0	2.1	50	23.8
		Total N	24	95	6	21

Note: Scores are from MAT Fall 1978 and Spring 1979, grades 2, 6 and 8 (Total Reading)

TABLE C

PERCENTAGE OF BILINGUAL STUDENTS IN SERVED AND NOT SERVED GROUPS WHO HAD INCREASED OR DECREASED READING PERCENTILE SCORES BY PREVIOUS ACHIEVEMENT AND FLUENCY

Previous Achievement	Achievement Change	Service Group % Not Served	% Served	X^2	γ
L3S	down	25.7	26.0		
	same/up	74.3	74.0		
	Total N	109	96	.003	-.009
M3S	down	37.4	44.4		
	same/up	62.6	55.6		
	Total N	401	90	1.5	-.14
U3S	down	47.6	64.3		
	same/up	52.4	35.7		
	Total N	191	14	1.4	-.32
Fluency					
Low	down	47.1	35.9		
	same/up	52.9	64.1		
	Total N	51	145	1.9	.22
High	down	37.7	40.0		
	same/up	62.3	60.0		
	Total N	650	55	.11	-.04

Note: Scores are from MAT Fall 1978, Spring 1979 for grades 2, 6 and 8. (Total Reading)

AN INVESTIGATION OF THE EFFECTS OF BACKGROUND CHARACTERISTICS AND SPECIAL LANGUAGE SERVICE ON THE READING ACHIEVEMENT AND ENGLISH FLUENCY OF BILINGUAL STUDENTS

MANAGEMENT INFORMATION SUMMARY

REPORT NO. 79-20
NOVEMBER 1979

TOM MATTHEWS

Office of
Instructional Program Evaluation

Department of
Planning, Research & Evaluation

SEATTLE
PUBLIC
SCHOOLS

SEATTLE PUBLIC SCHOOLS
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INTRODUCTION

In June 1976 the Seattle School District adopted a plan to maintain compliance with the 1974 Lau v. Nichols Supreme Court decision. This plan formalized procedures to provide students from non-English language backgrounds an opportunity for full participation in the educational program. Since that time, partly as a result of increases in the population of interest, the District has steadily increased its budget for special services to bilingual students.*

Data generated pertaining to these services have included student achievement scores on standardized tests, amount and type of instructional services, relative English fluency assessments, language background, grade level and family income. Although most of these data were generated originally as by-products of Lau activities and not for the purposes of program evaluation, numerous requests to use the current data base to investigate the effects of special language services have been received. This report attempts to address the primary questions raised through these requests, and it examines the complex relationships among student outcomes, student characteristics and educational inputs. Such an investigation should be of interest to those concerned specifically with implementing bilingual programs and to those concerned with the effects of District programs in general.

This report is a summary of report No.79-19, An Investigation of the Effects of Background Characteristics and Special Language Service on the Reading Achievement and English Fluency of Bilingual Students. Using several pertinent background and school variables, the report explains some of the variation in English reading achievement and fluency levels among bilingual students. Special emphasis has been placed on an investigation of the effects of special language services. The approach adopted for the investigation

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* For the purposes of this report a bilingual student is defined as any student who has been assigned to a relative English fluency category between A and E, inclusive (i.e., any student with a primary or home language other than English).

required that a conceptual model be constructed. The presumed causal and noncausal relationships among all variables in the explanatory model were stated explicitly. Other models could have been constructed; however, the one presented in this report was judged to be reasonable and was used to guide subsequent data analyses and interpretations.

Variables

Variables used in the model are listed below along with the measurement procedures employed.

1) Achievement - Spring 1979 Metropolitan Achievement Test (MAT) Total Reading percentile scores were used for students in grades 2, 4, 6 and 8.

2) Previous Achievement - Fall 1978 MAT Total Reading percentiles for students in grades 2, 6 and 8 were used.

3) Special Language Services - Students were divided into two groups: those who received some special language services (English as a Second Language or Bilingual instruction in required subject matter) and those who did not.

4) Relative English Fluency - Two fluency groups were constructed: low fluency (A & B)* and higher fluency (C, D & E).

5) Language Background - All language groups were combined into seven categories and an "Other" languages group, based on frequency of occurrence in this District: Chinese, Philippine, Korean, Spanish, Japanese, Samoan, Vietnamese and other languages.

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* Relative English fluency categories are usually defined in the following manner, consistent with the scale described in the District's Lau Plan.

A. Speaks no English
B. Speaks less English than another language
C. Speaks English and another language with equal ease
D. Predominantly speaks English
E. Speaks only English

6) Family Income - Students were divided into two groups: Those who were eligible for free or reduced-price lunch, and those who were not.

7) Grade Level - Students from grades 2 and 4 were grouped into one category, and students from grades 6 and 8 were placed in another.

PRESUMED RELATIONSHIPS

The reading achievement levels of bilingual students can be explained, in part, using each of the measures discussed previously. However, because each of these characteristics is related in some way to achievement, as well as to other variables in the system, it is somewhat misleading to examine a single relationship between two characteristics (e.g. service and achievement or fluency and achievement) without considering the effects of other factors. Figure 1 is presented in an attempt to show diagrammatically the direction and location of various presumed relationships. Single headed arrows indicate the assumed direction of causal flows, and curved double headed arrows indicate noteworthy relationships among variables with no presumed causal link. Admittedly, the existence of the causal flows shown in this diagram cannot be proved; however, the diagram does link each variable in the system in a reasonable manner. The model acts as a tool which guides data analyses, and it provides a framework for the interpretation of results.

Background Characteristics and Achievement

Because background characteristics such as family income and language group occur before school achievement, in time, they may be viewed as indicators of life experiences which have an impact on school achievement. In an attempt to interpret the results of analyses presented herein, it has been assumed that variations in previous experiences (as represented by family income and language group) result in achievement differences. For example, students who originate from groups with adequate economic resources tend to have been exposed to environments which enhance school achievement. Likewise, different language backgrounds as indicators of divergent cultural experiences may tend to be related to differences in school achievement.

A MODEL SHOWING THE ASSUMED RELATIONSHIPS

BETWEEN SCHOOL ACHIEVEMENT AND OTHER CAUSAL FACTORS

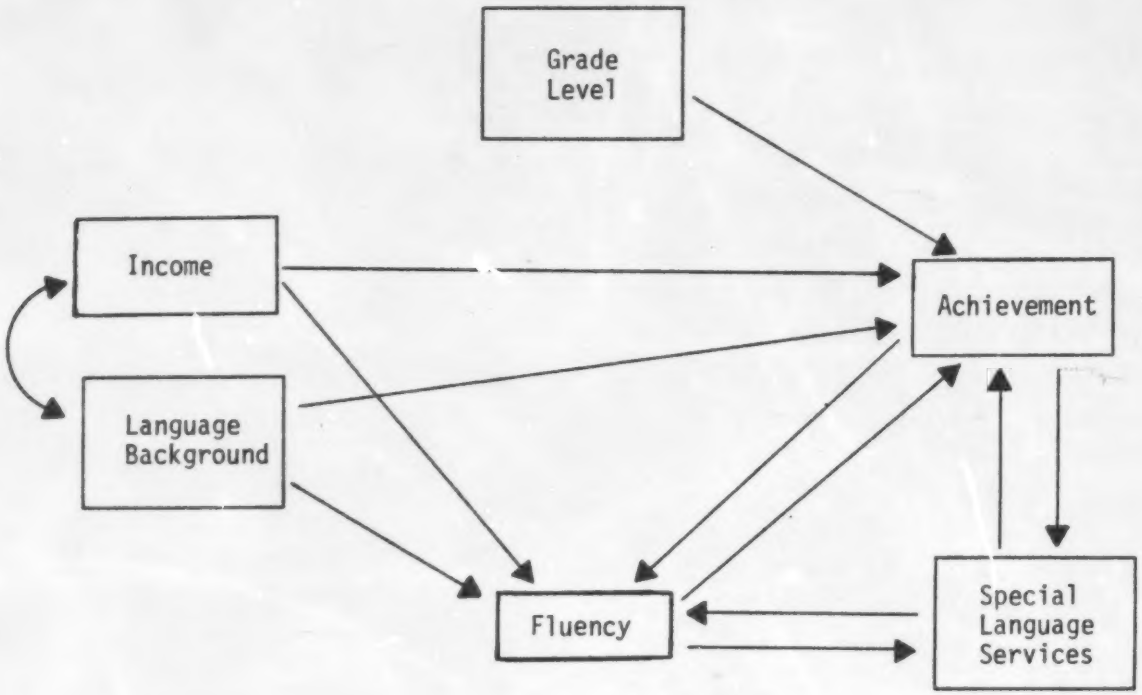

Figure 1

Some exceptions to this line of reasoning do occur. For instance, some bilingual students may have been reared in relatively high income environments; yet they are currently receiving free or reduced-price lunch because of economic problems associated with recent immigration. Similarly, language background as categorized here is only a very general description of differences in experiences. Despite exceptions, the presumption of a causal effect on achievement from background characteristics like income and language group seems reasonable as a tool to help explain achievement variations.

Fluency and Achievement

Relative English language fluency appears also to have a direct impact on school achievement. Because most school experiences occur in the English language, students who are not fluent in English usually achieve at a lower level than those who are more fluent. Nearly all special language services are designed at least in part to improve school achievement by improving students' English fluency. Most special language programs are based on the premise that increases in English fluency will be followed by increases in school achievement.

However, unlike family income or language background, fluency changes appear both to cause and to be caused by changes in achievement. For instance, an increase in fluency leads to achievement gains, and these gains eventually lead to higher assessments of fluency. Through this process a low achieving, low fluency student becomes a higher fluency, higher achieving student.

Special Language Service, Fluency and Achievement

In the model presented here a two-way causal flow is assumed between special language service and achievement. Further, it is assumed that service and achievement affect one another in an antagonistic manner. That is, increases in service presumably lead to increases in school achievement; however, these achievement increases tend to reduce the amount of special service received, thereby moderating the original effect of service. A similar two-way causal flow presumably exists between fluency and service. Low English fluency levels lead directly to high concentrations of service, but the increase in service presumably has the desired effect of raising fluency levels, thereby reducing the need for further service.

These antagonistic effects are difficult to isolate and examine because the two variables tend to work against one another. Further, it becomes difficult to talk precisely about the effects of service on fluency, or service on achievement, when the amount of service causes and in turn is caused by both variables. This methodological difficulty will persist as long as services are delivered primarily to those groups assumed to have the greatest need.

Grade Level and Achievement

Grade level as an indicator of student age presumably has an important effect on the achievement of low English fluency students. Older, low fluency students might often appear farther behind in school because they are expected to achieve at a higher level than younger students. Further, students functioning with an English fluency handicap would be expected to fall farther behind as the curriculum becomes more complex and language dependent.

SUMMARY OF RESULTS AND CONCLUSIONS

Analyses were performed based upon the relationships suggested by the model. Results prompted the following conclusions.

1. The characteristics which distinguish bilingual students, as a group, from other student populations in the District are shown below.

   a) Large proportions of students with low relative English fluency

   b) Primarily Asian language backgrounds

   c) Lower reading achievement

   d) Higher math achievement

   e) Relatively large proportions of low income families

2. The following relationships between reading achievement and other characteristics of bilingual students were obtained.

   a) Special language services (ESL and Bilingual RSM*) are concentrated among low achieving students. Over half of the bilingual students who receive special language services score in the lower three stanines in reading achievement; students who are not served tend not to score as low (14.8% score in the lower 3 stanines).

   b) Over 60% of the low fluency students (A & B) score in the lower three stanines in reading; students with higher fluency levels (C, D & E) tend to score higher than expected, given national norms (only 14.1% in the lower three stanines). A perfect relationship between fluency and achievement was not obtained. As a result, some high achieving, low fluency students were identified. This pattern should not be surprising, since relative English fluency and reading achievement are not identical characteristics and neither is measured with perfect reliability.

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*ESL - Instruction in English as a second language
Bilingual RSM - Bilingual instruction in required subject matter

c) A larger proportion of the students from low income families (eligible for free or reduced-price lunch) than from higher income families, score in the lower three stanines in reading.

d) Some language groups have higher proportions of low achieving students than other groups. Samoan and Vietnamese groups contain the highest proportions of low achievers (L3S). Japanese and "Other" language groups have the highest proportions of high achieving students (U3S).

e) Students in grades 6 and 8 tend to score lower in reading than students from lower grades.

3. The following additional relationships were obtained between relative English fluency and other characteristics of bilingual students.

a) In 1978-79, nearly 83% of the fluency category A & B students were receiving some form of special language service; less than 10% of the C, D and E students were receiving such services.

b) Low English fluency students tend to be from low income families, as determined by their eligibility for free or reduced-price lunch. Over half of the fluency categories A & B students are from low income families; only 35% of the C, D, & E students are from similar circumstances.

c) The largest proportions of low fluency students are from Chinese and Vietnamese language groups. Within language groups, Vietnamese and Korean speaking groups have the highest proportion of low fluency students.

4. The relationship between fluency and achievement is different within various language groups. The relationship between fluency and achievement was strongest among students who speak Philippine languages; Samoan speaking groups yielded the weakest relationship. This result suggests that increases in fluency should be expected to have a different impact on achievement within different language groups, and that groups such as Samoan speakers may require service that is designed to address problems in addition to limited fluency.

5. Bilingual students who have not received special language services tend to score higher in reading than students who have received such services. Results consistent with this conclusion were obtained when previous achievement, fluency levels and/or other background characteristics were controlled. Further, the proportions of students who increased their reading percentile scores from fall 1978 to spring 1979 were not significantly different in served and not served groups. One may assume that these achievement patterns reflect the fact that students who receive special language services tend to be those who have the greatest need for services, and that those who receive no service tend to have no pressing need. However, the data are consistent also with the notion that special language services inhibit reading achievement in English. A well designed study which maintains some control over the assignment of students to service groups is required to determine which explanation is correct.

6. Approximately two-thirds of the students in fluency categories A & B who were in the District for a three year period (1975-76 to 1978-79) moved to fluency categories C, D or E within that time. As might be expected, students in fluency category A showed proportionately fewer shifts to category C or above than students in category B. These findings must be related to criteria for state funding of bilingual services which is beginning in 1979-80. A three year maximum service period for each low fluency student is generally specified for state funding.

7. Fluency category A & B students who have received no ESL service tend to move to fluency level C or above proportionately more often than students who have received between one and three years of ESL service. Again, this relationship probably exists because students who have the greatest need for service tend to be served in repeated years. Students who do not need service may tend to progress steadily in fluency without special aid. However, a study with more rigorous controls is needed to determine why one observes less rapid fluency movements among students who receive more special language services.

THE MODEL RECONSIDERED

Because the conceptual model presented in this paper guided data analyses, it is useful to determine where the empirical results and the assumed model are consistent. For example, results were consistent with the assumption of a direct effect of grade level, income and language background on the reading achievement of bilingual students. Higher achieving students tended to be from specific language groups, higher income families and lower grade levels. The assumption that family income and language background have a direct effect on English fluency was also consistent with the data. Higher fluency students tended to come from higher income families and specific language groups. The results were consistent also with the assumption that fluency and achievement reinforce one another. That is, high fluency appears to lead to high achievement which in turn leads to still higher fluency levels. This reinforcing pattern is reflected by a strong positive relationship between relative English fluency and reading achievement.

It is much more difficult to reasonably interpret the agreement between the model and the results where antagonistic, two-way causal assumptions are involved (i.e., between fluency and service, or achievement and service). For example, results indicate that students in low fluency groups tend to receive most of the special language service. As indicated in an earlier discussion of the model, this result probably reflects the fact that students receive service until their fluency levels rise; then service is withheld (i.e. a two-way antagonistic effect).

In a similar vein results indicate that bilingual students who have received special language services tend to achieve at lower levels than those who have not been served. This finding is consistent with the antagonistic, two-way causal flow assumed to exist between special language service and achievement. That is, results agree with the assumption that low achieving students are served until their achievement rises; then special language service is withheld as the student shows a sufficient level of achievement. However, the results are consistent also with the possible existence of a direct negative effect of special language service on achievement. The finding that students who are not served tend to achieve

at higher levels than students who are served is especially difficult to interpret as a result of program implementation procedures, because it persists even when variables such as fluency and previous achievement are held constant. Given the limitations of the current data base it is impossible to determine with any confidence whether the results are a reflection of the effects of service or whether they merely reflect current program implementation practices.

LIMITATIONS

Limitations associated with data analysis must be acknowledged so that the reader can assess the integrity and generalizability of results. In addition, limitations to an evaluation study should be identified and removed in future projects. For these reasons the following are presented.

1. All analyses of achievement levels are limited to a sample of bilingual students in grades 2, 4, 6 and 8 who were administered the MAT during the 1978-79 school year.

2. When the data used in this analysis were generated, no attempt was made to form comparable served and not served groups for the purposes of an evaluation of service effectiveness. Therefore, all comparisons are necessarily "after the fact" and subject to several reasonable but varied interpretations.

3. On several occasions, comparisons were meaningless because data available from the existing bilingual population yielded sample sizes within groups that were extremely small and/or disproportionate.

4. Much of this report has been devoted to an analysis of reading achievement in English. One might assert that this outcome is not directly pertinent to the current objectives of special language programs. However, standardized tests utilizing the native languages of the students under study were not available, nor were measures available that were tied more directly to course objectives.

5. The practice of delivering service to those students with the greatest perceived need and withholding service when it is judged as unnecessary yields service comparisons that should be interpreted with extreme caution.

6. Comparisons of fluency changes across service groups should also be interpreted with caution because service is administered mostly to those students with low English fluency levels. Low English fluency students who are not served are probably different in several important ways (e.g. many have refused special language service) from those who are served.

RECOMMENDATION

With the aid of the current data base, this report has described the bilingual population in terms of reading achievement, fluency, service, grade level, language background and family income. In addition, relationships among these characteristics have been examined. However, an analysis of the current data base did not yield conclusions concerning the effects of special language services which could be defended strongly. A number of insurmountable limitations precluded a definitive analysis of the effects of special language programs.

Given this impasse and assuming that the District and public require estimates of the magnitude of the effects of special language services, it is recommended that an evaluation be planned and implemented which contains the controls, outcome criteria, program definitions and objectives needed to address questions of service effectiveness. This study would require extensive cooperation between the staff of the Bilingual Programs Office, and the Evaluation Office, and it would yield information that would be prerequisite to an investigation of the cost effectiveness of various modes of special language services.